



DECLARATION

I, Atsuko SANABE, translator of the attached documents, do hereby certify that to the best of my knowledge and belief the attached documents are the true English translation of Japanese Patent Application No. Hei 11-082803 duly filed with the Japan Patent Office on March 26, 1999.

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Atsuko Sanabe

Atsuko Sanabe

Ricoh Technology Research, Inc.

3-2-3, Shin-yokohama, Kohoku-ku

Yokohama, 222-8530 Japan

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	[Inventor]	
	[Address]	c/o Ricoh Company, Ltd.
10		3-6, Nakamagome 1-chome, Ohta-ku, Tokyo
	[Name]	Tatsuo Okuda
	[Applicant]	
	[Id. No.]	000006747
	[Name]	Ricoh Company, Ltd.
15	[Representative]	Masamitsu Sakurai
	[Agent]	
	[Id. No.]	100082636
	[Patent Attorney]	
	[Name]	Shuji Sanada
20	[Telephone No.]	03(3586)6969
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[Name of Document] Specification
[Title of the Invention] Digital Camera
[Scope of Claims]

[Claim 1]

- 5 A digital camera comprising:
 a photographic optical system for forming an image of an object;
 an imaging device for converting an optical object image formed
through the photographic optical system into electronic image data;
 a recording medium for recording the image data;
10 an operational means for enabling a user to set photographing
instructions;
 a photographing process means for performing a predetermined
processing to the image data converted by the imaging device in
accordance with the instruction of the operational means and for
15 writing the image data in the recording medium;
 a replay and display means for reproducing and displaying the
image data photographed by the imaging device and the image data
recorded in the recording medium onto the display screen; and
 a strobe flash means for illuminating an object when
20 photographing, the digital camera being characterized by comprising:
 a camera body that is provided with the photographic optical
system, imaging device, recording medium, operational means,
photographing process means, replay and display means and strobe flash
means, and that includes an objective lens incidence plane of the
25 photographic optical system and a strobe flashing unit of the strobe
flash device exposed on a front of the camera body, at least a part
of the operation device at an appropriate place on a outer surface
of the camera body and a display screen of the replay and display means
exposed on a back of the camera body;
30 a first cover means including a first cover member provided on
the back of the camera body slidably within a predetermined sliding
range, the first cover member being configured to cover the display
screen of the replay and display means when the first cover member

is located at a first position in the sliding range, and to expose the display screen of the replay and display device when located at a second position within the predetermined sliding range;

a second cover means that is mechanically coupled with the first
5 cover means and that is configured to cover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means located on the front of the camera body with a second cover member when the first cover member is operated to locate at the first position, and, to evacuate the second
10 cover member and expose the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means when the first cover member is operated to locate at the second position; and

a power switching means that is coupled to at least either of
15 the first and second cover means and caused to be turned on to supply power to a whole system of the camera for activating the camera when the first and second cover members are slid to open and expose the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe
20 flashing unit of the strobe flash means and also to be turned off to stop supplying the power when the first and second cover members are slid to close and cover the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash device.

25 [Claim 2]

A digital camera comprising:

a photographic optical system for forming an image of an object;
an imaging device for converting an optical object image formed through the photographic optical system into electronic image data;

30 a recording medium for recording the image data;

an operational means for enabling a user to set photographing instructions;

a photographing process means for performing a predetermined

processing to the image data converted by the imaging device in accordance with the instruction of the operational means and for writing the image data in the recording medium;

5 a replay and display means for reproducing and displaying the image data photographed by the imaging device and the image data recorded in the recording medium onto the display screen; and

a strobe flash means for illuminating an object when photographing, the digital camera being characterized by comprising:

10 a camera body that is provided with the photographic optical system, imaging device, recording medium, operational means, photographing process means, replay and display means and strobe flash means, and that includes an objective lens incidence plane of the photographic optical system and a strobe flashing unit of the strobe flash device exposed on a front of the camera body, at least a part
15 of the operation device at an appropriate place on a outer surface of the camera body and a display screen of the replay and display means exposed on a back of the camera body;

a first cover means including a first cover member provided on the back of the camera body slidably within a predetermined sliding
20 range, the first cover member being configured to cover the display screen of the replay and display means when the first cover member is located at a first position in the sliding range, and to expose the display screen of the replay and display device when located at a second position within the predetermined sliding range;

25 a second cover means including a second cover member which is provided slidably on the front of the camera body for covering and uncovering the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means, the second cover means causing, by mechanically coupling with the first
30 cover means, the second cover member to cover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means provided on the front of the camera body and the first cover member to position at the first position

when the second cover member is located at the first position, and also causing the second cover member to evacuate to expose the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means arranged at the front of the camera body and the first cover member to position at the second position when the second cover member is located at the second position; and

a power switching means that is coupled with at least either of the first and second cover means and caused to be turned on to supply power to a whole system of the camera for activating the camera when the first and second cover members are slid to open and expose the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means and also to be turned off to stop supplying the power when the first and second cover members are slid to close and cover the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash device.

[Claim 3]

The digital camera as described in claim 1 or 2, characterized in that the camera body is provided with the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means at an upper edge of one-side half of the front of camera body, and that the second cover member includes a member to cover and uncover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means by being slid in a horizontal direction at the upper edge of the front of the camera body.

[Claim 4]

The digital camera as described in claim 1 or 2, characterized in that the camera body is provided with the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means at an upper edge of one-side half of the

front of camera body, and that the second cover member includes a member to cover and uncover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means by being slid in a vertical direction at the upper edge
5 of the front of the camera body.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to a digital camera that stores
10 image data obtained by an imaging device such as a solid-state imaging device into a recording medium, and more particularly, to a digital camera featuring in an improved shape and ease of use in terms of portability and photography.

[Background art]

15 [0002]

Conventionally, a camera using a silver halide film has been widely used for photography. On the other hand, a so-called digital camera has recently become increasingly widespread. In the digital cameras, an object image is photographed by a solid-state imaging
20 device, such as a charged coupled device (CCD) or the like, and image data of an object are obtained and digitally recorded as static image (still image) or moving image (movie image) in an IC memory medium such as an IC (integrated circuit) card which is called a PC card, a video floppy disk or the like.

25 [0003]

This type of digital camera digitally performs, except optical systems, almost all functions from basic photographing functions to add-on accessory functions. As the digital camera processes image data of an object electrically, a space for film transport mechanism
30 is not required and much latitude is allowed in designing function and layout of the digital camera. Therefore, it should be easier to obtain a digital camera surpassing in ease of use, portability and appearance through an appropriate plan for adequate functions and

layout of each part. However, at present, most of digital cameras are designed following a standard layout of silver halide film cameras, and therefore, layout and handling ease of a digital camera remains similar to that of a silver halide film camera. Further, not many
5 digital cameras have a lens cover to protect its photographing lens.

[0004]

For example, in Japanese Patent Laid-Open Publication Nos. Hei 6-43534 and Hei 7-82186, an example of a silver halide film camera, having a strobe flashing unit on a lens barrier which moves up and
10 down to cover and uncover the front of a photographing lens, is described, and in those published patents bulletins of Japanese Patent Laid-Open Publication Nos. Hei 6-43534 and 7-82186, the cameras are designed such that in a state that the lens cover is moved upward to be opened, the front of the photographing lens is exposed and at the
15 same time the strobe flashing unit located inside of the lens barrier is directed toward an object. And in a state that the lens barrier is moved downward to be closed, the front of the photographing lens is covered by the lens barrier and at the same time the strobe flashing unit located inside the lens barrier is concealed inside. Further,
20 in the published bulletins of Japanese Patent Laid-Open Publication Nos. Hei 6-43534 and 7-82186, the camera has a built-in collapsible rangefinder at the lens barrier portion forming a light passage above the photographing lens when the lens barrier is opened.

[0005]

25 Also, for example, a silver halide film camera, having a lens barrier to cover and uncover the front of a photographing lens by sliding the lens barrier in the directions of left and right, is described in Japanese Patent Laid-Open Publication No. 7-333687. The camera has a lens barrier designed to open and expose the photographing
30 lens when the barrier is slid to the left (viewed from the front), and to close and cover the front of the photographing lens when the barrier is slid to the right. In Japanese Patent Laid-Open Publication No. 7-333687, only the sliding lens barrier is described

and description of a strobe flashing unit is not included.

[0006]

[Problems to be solved]

The cameras shown in the above-mentioned Japanese Patent
5 Laid-Open Publication Nos. Hei 6-43534 and Hei 7-82186 are silver
halide film cameras, not a digital camera, and the lens barrier moves
up and down. The lens barrier of the camera in the above Japanese
Patent Laid-Open Publication No. Hei 7-333687 slides in the directions
of left and right in front of the photographing lens. Further, the
10 overall shape of cameras illustrated in Japanese Patent Laid-Open
Publication Nos. Hei 6-43534, Hei 7-82186, and Hei 7-333687 is that
of a classic type.

[0007]

As mentioned above, the digital cameras generally employ a
15 classical shape of silver halide film cameras, and even though a lens
barrier for protecting a photographing lens is incorporated, the shape
of the digital cameras does not differ significantly from that of
silver halide film cameras. Specifically, in digital cameras, even
though much latitude is allowed, compared to silver halide film cameras,
20 in designing a functional structure and layout of the camera, the
greater latitude is not fully utilized to improve ease of use,
portability and appearance of the camera. Further in a digital camera,
a display device such as a liquid crystal display or the like is widely
used. A cover glass may be used to protect a display screen of the
25 liquid crystal device or the like, which however may cause a reduction
of transmissivity to the display screen and a reflection of light due
to its permeability of light and reflected light of the surface, and
the visibility of the displayed image may be impeded.

[0008]

30 The present invention has been made in view of the
above-discussed and other problems and an object of the present
invention is to provide a digital camera with an improved portability
and operability, and ease in handling, making most of the latitude

in designing functional structure and layout. In particular, the object of the claim 1 of the present invention is to, when the camera is being carried, prevent a replay and display screen, an objective lens incidence plane of photographic optical system and a strobe
5 flashing unit from exposing and from being accidentally operated, thereby improving the portability, and to provide a digital camera, without degrading the operability, in which the camera becomes ready to shoot with a single operation of exposing the replay and display screen located on a back of the camera.

10 [0009]

The object of the claim 2 of the present invention is to, in particular, when the camera is being carried, prevent a replay and display screen, an objective lens incidence plane of photographic optical system and a strobe flashing unit from exposing and from being
15 accidentally operated, thereby improving the portability, and to provide a digital camera without degrading the operability in which the camera becomes ready to shoot with a single operation of exposing the incidence plane of photographic optical system located on a front of the camera. The object of the claim 3 of the present invention
20 is to provide a digital camera requiring a substantially small space for a structure of cover and uncover mechanism of an objective lens incidence plane of photographic optical system and a strobe flashing unit located on a front of the camera. The object of the claim 4 of the present invention is, in particular, to provide a digital camera
25 requiring a substantially small space for a structure of cover and uncover mechanism of an objective lens incidence plane of photographic optical system and a strobe flashing unit located on a front of the camera allowing an easier designing for manufacturing with a small space occupied.

30 [0010]

[Means for Solving the Problems]

For solving the aforementioned problems, a digital camera as described in claim 1 according to the present invention comprises:

a photographic optical system for forming an image of an object;
an imaging device for converting an optical object image formed
through the photographic optical system into electronic image data;
a recording medium for recording the image data;

5 an operational means for enabling a user to set photographing
instructions;

a photographing process means for performing a predetermined
processing to the image data converted by the imaging device in
accordance with the instruction of the operational means and for
10 writing the image data in the recording medium;

a replay and display means for reproducing and displaying the
image data photographed by the imaging device and the image data
recorded in the recording medium onto the display screen; and

a strobe flash means for illuminating an object when
15 photographing, and the digital camera is characterized by comprising:

a camera body that is provided with the photographic optical
system, imaging device, recording medium, operational means,
photographing process means, replay and display means and strobe flash
means, and that includes an objective lens incidence plane of the
20 photographic optical system and a strobe flashing unit of the strobe
flash device exposed on a front of the camera body, at least a part
of the operation device at an appropriate place on a outer surface
of the camera body and a display screen of the replay and display means
exposed on a back of the camera body;

25 a first cover means including a first cover member provided on
the back of the camera body slidably within a predetermined sliding
range, the first cover member being configured to cover the display
screen of the replay and display means when the first cover member
is located at a first position in the sliding range, and to expose
30 the display screen of the replay and display device when located at
a second position within the predetermined sliding range;

a second cover means that is mechanically coupled with the first
cover means and that is configured to cover the objective lens

incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means located on the front of the camera body with a second cover member when the first cover member is operated to locate at the first position, and, to evacuate the second
5 cover member and expose the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means when the first cover member is operated to locate at the second position; and

a power switching means that is coupled to at least either of
10 the first and second cover means and caused to be turned on to supply power to a whole system of the camera for activating the camera when the first and second cover members are slid to open and expose the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe
15 flashing unit of the strobe flash means and also to be turned off to stop supplying the power when the first and second cover members are slid to close and cover the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash device.

20 [0011]

A digital camera as described in claim 2 comprises:

a photographic optical system for forming an image of an object;
an imaging device for converting an optical object image formed through the photographic optical system into electronic image data;

25 a recording medium for recording the image data;

an operational means for enabling a user to set photographing instructions;

a photographing process means for performing a predetermined processing to the image data converted by the imaging device in
30 accordance with the instruction of the operational means and for writing the image data in the recording medium;

a replay and display means for reproducing and displaying the image data photographed by the imaging device and the image data

recorded in the recording medium onto the display screen; and

a strobe flash means for illuminating an object when photographing, and the digital camera is characterized by comprising:

a camera body that is provided with the photographic optical system, imaging device, recording medium, operational means, 5 photographing process means, replay and display means and strobe flash means, and that includes an objective lens incidence plane of the photographic optical system and a strobe flashing unit of the strobe flash device exposed on a front of the camera body, at least a part 10 of the operation device at an appropriate place on a outer surface of the camera body and a display screen of the replay and display means exposed on a back of the camera body;

a first cover means including a first cover member provided on the back of the camera body slidably within a predetermined sliding 15 range, the first cover member being configured to cover the display screen of the replay and display means when the first cover member is located at a first position in the sliding range, and to expose the display screen of the replay and display device when located at a second position within the predetermined sliding range;

20 a second cover means including a second cover member which is provided slidably on the front of the camera body for covering and uncovering the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means, the second cover means causing, by mechanically coupling with the first 25 cover means, the second cover member to cover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means provided on the front of the camera body and the first cover member to position at the first position when the second cover member is located at the first position, and 30 also causing the second cover member to evacuate to expose the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means arranged at the front of the camera body and the first cover member to position at

the second position when the second cover member is located at the second position; and

a power switching means that is coupled with at least either of the first and second cover means and caused to be turned on to supply
5 power to a whole system of the camera for activating the camera when the first and second cover members are slid to open and expose the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means and also to be turned off to
10 stop supplying the power when the first and second cover members are slid to close and cover the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash device.

[0012]

15 The digital camera as described in claim 3 according to the present invention is characterized in that the camera body is provided with the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means at an upper edge of one-side half of the front of camera body and that the
20 second cover member includes a member to cover and uncover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means by being slid in a horizontal direction at the upper edge of the front of the camera body. The digital camera as described in claim 4 is characterized
25 in that the camera body is provided with the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means at an upper edge of one-side half of the front of camera body and that the second cover member includes a member to cover and uncover the objective lens incidence plane of the
30 photographic optical system and the strobe flashing unit of the strobe flash means by being slid in a vertical direction at the upper edge of the front of the camera body.

[0013]

[Effects] Specifically, the digital camera according to claim
1 of the present invention includes a camera body including:

a photographic optical system for forming an image of an object;

an imaging device for converting an optical object image formed
5 through the photographic optical system into electronic image data;

a recording medium for recording the image data;

an operational means for enabling a user to set photographing
instructions;

a photographing process means for performing a predetermined
10 processing to the image data converted by the imaging device in
accordance with the instruction of the operational means and for
writing the image data in the recording medium;

a replay and display means for reproducing and displaying the
image data photographed by the imaging device and the image data
15 recorded in the recording medium onto the display screen; and

a strobe flash means for illuminating an object when
photographing,

and the digital camera includes:

an objective lens incidence plane of the photographic optical
20 system and a strobe flashing unit of the strobe flash device exposed
on a front of the camera body, at least a part of the operation device
at an appropriate place on a outer surface of the camera body and a
display screen of the replay and display means exposed on a back of
the camera body;

25 a first cover means including a first cover member provided on
the back of the camera body slidably within a predetermined sliding
range, the first cover member being configured to cover the display
screen of the replay and display means when the first cover member
is located at a first position in the sliding range, and to expose
30 the display screen of the replay and display device when located at
a second position within the predetermined sliding range;

a second cover means that is mechanically coupled with the first
cover means and that is configured to cover the objective lens

a photographic optical system for forming an image of an object;
an imaging device for converting an optical object image formed
through the photographic optical system into electronic image data;
a recording medium for recording the image data;

5 an operational means for enabling a user to set photographing
instructions;

a photographing process means for performing a predetermined
processing to the image data converted by the imaging device in
accordance with the instruction of the operational means and for
10 writing the image data in the recording medium;

a replay and display means for reproducing and displaying the
image data photographed by the imaging device and the image data
recorded in the recording medium onto the display screen; and

a strobe flash means for illuminating an object when
15 photographing,

and the digital camera includes:

an objective lens incidence plane of the photographic optical
system and a strobe flashing unit of the strobe flash device exposed
on a front of the camera body, at least a part of the operation device
20 at an appropriate place on a outer surface of the camera body and a
display screen of the replay and display means exposed on a back of
the camera body;

a first cover means including a first cover member provided on
the back of the camera body slidably within a predetermined sliding
25 range, the first cover member being configured to cover the display
screen of the replay and display means when the first cover member
is located at a first position in the sliding range, and to expose
the display screen of the replay and display device when located at
a second position within the predetermined sliding range;

30 a second cover means including a second cover member which is
provided slidably on the front of the camera body for covering and
uncovering the objective lens incidence plane of the photographic
optical system and the strobe flashing unit of the strobe flash means,

incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means located on the front of the camera body with a second cover member when the first cover member is operated to locate at the first position, and, to evacuate the second
5 cover member and expose the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means when the first cover member is operated to locate at the second position; and

a power switching means that is coupled to at least either of
10 the first and second cover means and caused to be turned on to supply power to a whole system of the camera for activating the camera when the first and second cover members are slid to open and expose the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe
15 flashing unit of the strobe flash means and also to be turned off to stop supplying the power when the first and second cover members are slid to close and cover the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash device.

20 [0014]

With such a configuration, a digital camera with an improved portability and operability, and ease in handling, is provided, by making most of the latitude in designing functional structure and layout. When the camera is being carried, by preventing a replay and
25 display screen, an objective lens incidence plane of photographic optical system and a strobe flashing unit from exposing and from being accidentally operated, the portability may be improved, and without degrading the operability, the camera becomes ready to shoot with even a single operation of exposing the replay and display screen located
30 on a back of the camera.

[0015]

A digital camera according to claim 2 of the present invention includes a camera body including:

the second cover means causing, by mechanically coupling with the first cover means, the second cover member to cover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means provided on the front of the camera body and the first cover member to position at the first position when the second cover member is located at the first position, and also causing the second cover member to evacuate to expose the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means arranged at the front of the camera body and the first cover member to position at the second position when the second cover member is located at the second position; and

a power switching means that is coupled with at least either of the first and second cover means and caused to be turned on to supply power to a whole system of the camera for activating the camera when the first and second cover members are slid to open and expose the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means and also to be turned off to stop supplying the power when the first and second cover members are slid to close and cover the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash device.

[0016]

With such a configuration, in particular, when not in use, i.e., being carried, the digital camera capable of preventing a replay and display screen, an objective lens incidence plane of photographic optical system and a strobe flashing unit from exposing and from being accidentally operated, may be provided. Thus, the portability may be improved and the operability is not degraded as seen from the fact that the camera becomes ready to shoot with even a single operation of exposing the lens incidence plane of the photographic optical system located on a front of the camera.

[0017]

In the digital camera as described in claim 3, the camera body is provided with the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means at an upper edge of one-side half of the front of camera body, and the second cover member includes a member to cover and uncover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means by being slid in a horizontal direction at the upper edge of the front of the camera body. With such a configuration, a structure of cover and uncover mechanism of an objective lens incidence plane of photographic optical system and a strobe flashing unit located on a front of the camera may be provided in a substantially small space.

[0018]

In the digital camera as described in claim 4 of the present invention, the camera body is provided with the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means at an upper edge of one-side half of the front of camera body, and the second cover member includes a member to cover and uncover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means by being slid in a vertical direction at the upper edge of the front of the camera body. With such a configuration, in particular, it becomes easier to design for manufacturing a structure of cover and uncover mechanism of an objective lens incidence plane of photographic optical system and a strobe flashing unit located on a front of the camera, with a small space occupied.

[0019]

[Preferred Embodiments of the Invention]

Referring now to the drawings, a digital camera according to the present invention will be described in detail based on the preferred embodiments. Fig. 1 is a perspective view of a front side of a digital camera not in use, namely, in a state that a cover is closed while

being carried, according to an embodiment of the present invention. Fig. 2 is a perspective view of a backside of the digital camera in a state that the cover is open. Figs. 3 and 4 are perspective views of the front and back of the same digital camera while not being carried, i.e., while being used and in a state that the cover is open. Fig. 5 is a block diagram schematically showing an electrical structure of the same digital camera. A digital camera illustrated in Figs. 1 through 4 includes a camera body 1, a shutter release button 2, a photographic optical system 3, a display cover 4, a lens/strobe flash cover 5, a nonskid grip pits/projection 6, a mode dial 7, operation buttons 8, indication lamps 9, a display screen 10, and a strobe flashing unit 11.

[0020]

The camera body 1 is shaped into almost a rectangular parallelepiped with curved corners. The camera has, as shown in Figs. 1 through 4, the shutter release button 2 on the top of the camera body 1, the photographic optical system 3 and the strobe flashing unit 11 on the front of the camera body 1 near an upper end on the left side (viewed from a photographer), the nonskid grip pits/projection 6 on the front of the camera body 1 near a grip area on the right side (viewed from the photographer), the mode dial 7 at an upper-right corner of the camera body 1, the operation buttons 8 and the indication lamps 9 near an upper end of the back of the camera body 1 and the display screen 10 on the back of the camera body 1 occupying substantially the left half (viewed from the photographer) of the back of the camera body 1.

[0021]

When the camera is not in use as shown in Figs. 1 and 2, the display screen 10 is covered by the display cover 4, a first cover member, and an objective lens incidence plane of the photographic optical system 3 and the strobe flashing unit 11 are covered by the lens/strobe flash cover 5, a second cover member, as shown in Figs. 1 and 2. The display cover 4 is provided slidably in the directions

of left and right within a predetermined sliding range. The display screen 10 is covered when the display cover 4 slides to the left end (viewed from the photographer) of the predetermined sliding range, and is opened completely when the display cover 4 slides to the right
5 end of the predetermined sliding range as illustrated in Fig 4.

[0022]

The display cover 4 is configured to be latched in each of stop positions so as not to open accidentally when it is closed and not to close accidentally when it is opened though the latch can be
10 disengaged. It can be designed such that the display cover 4 slides to close against a force of a spring, not shown, and is locked by a locking mechanism, not shown, when the cover is completely closed, and the cover is opened by a spring force of the spring when the lock is released. Or alternatively, the cover may slide to open against
15 a force of a spring and is locked by a locking mechanism when the cover is fully opened, and the cover is closed by a spring force of the spring when the lock is released.

[0023]

The lens/strobe flash cover 5 is provided slidably in the
20 directions of left and right within a predetermined sliding range. The display screen 10 is covered when the lens/strobe flash cover 5 slides to the right end (viewed from a photographer) of the predetermined sliding range, and is uncovered completely when the lens/strobe flash cover 5 slides to the left end as shown in Fig. 3.
25 The lens/strobe flash cover 5 is mechanically coupled with the display cover 4 via a coupling mechanism such as a gear mechanism, a link mechanism or a chain/wire mechanism, or a combination of those mechanisms, now shown. Thus, the lens/strobe flash cover 5 is configured to open when the display cover 4 is opened, and is configured
30 to close when the display cover 4 is closed. When the display cover 4 is designed to move semi-automatically by a spring as described above, the lens/strobe flash cover 5 is designed so as to move by a power of the movement of the display cover 4. Further, it can be designed

such that the lens/strobe flash cover 5 may be slidable in the vertical direction instead of horizontal direction.

[0024]

A power switch that turns on and off a power supply for operating
5 the digital camera is activated coupled with the movement of the display cover 4 and the lens/strobe flash cover 5. Specifically, power is on when the display cover 4 and the lens/strobe flash cover 5 are opened, and power is off when the display cover 4 and the lens/strobe flash cover 5 are closed. The nonskid grip
10 pits/projection 6(6') is provided with a pit or a projection formed at positions where the forefinger, the middle finger and the third finger of the right hand come in touch when a photographer holds the digital camera with the right hand. The nonskid grip pits/projection 6(6') enables the photographer to hold the camera firmly so that the
15 camera may not slip off.

[0025]

The mode dial 7 is used to make a selection of an operation mode of the digital camera. For example, a recording mode, a replay mode, a transfer mode or a setup mode is selected by rotating the mode dial
20 7. The operation buttons 8 are used to operate the functions other than those operated by the power switch, the shutter release button 2 and the mode dial 7, i.e., various settings of the camera including erasing of recorded images etc., selection of frames for erasing and making a final determination of the selected setting. The indication
25 lamps 9 indicates information, by lighting or blinking, including various warnings, flash readiness and others, which are not displayed on the display screen 10. The display screen 10 displays image information obtained through an electronic viewfinder and various information relating to an operation of the digital camera, and the
30 operation buttons 8 and the indication lamps 9 are located adjacent to and above the display screen 10. The strobe flashing unit 11 gives an auxiliary light to an object when required.

[0026]

An electrical system structure of a digital camera as shown in Figs. 1 through 4 will now be described referring to the Fig. 5. In the present embodiment, the camera which may photograph and record not only still images, i.e., static images but also moving images and sound data for a short time of period will be explained as an example. The digital camera illustrated in Fig. 5 includes a lens system 101, a shutter mechanism 102, a CCD solid-state imaging device 103, a correlate dual sampling (CDS) circuit 104, a first analog to digital (A/D) converter 105, a digital signal processing circuit 106, an image data compression and decompression circuit 107, a first-in first-out (FIFO) 108, a card interface (I/F) 109, a PC card 110, a microphone 111, an amplifier and filter 112 (AMP/FILTER), a second analog-to-digital (A/D) converter 113, a sound data compression and decompression circuit 114, a digital-to-analog (D/A) converter 115, an amplifier and filter 116, a central processing unit (CPU) 121, a display device (liquid crystal display: LCD) 122, an operation unit 123, a transmission unit 124, a lens driver 125, a signal generator (SG) 126, a strobe flash unit 127, a battery 128, a DC-DC converter 129 and a power switch 130.

[0027]

The lens system 101 and the shutter mechanism 102 are comprised of a photographic optical system 3 for forming an image of an object. The shutter mechanism 102 includes an aperture mechanism and a filter mechanism and controls an exposure time when a shutter is released. The CCD solid-state imaging device 103 is used as an imaging device in this embodiment. The CCD solid-state imaging device 103 converts an optical image obtained through the photographic optical system 3 to an electrical signal. A photographic processing means includes, in the present case, the CDS circuit 104, the first A/D converter 105, the digital signal processing unit 106, the image data compression and decompression circuit 107, the FIFO 108 and the CPU 121.

[0028]

The CDS circuit 104 reduces noise components in the CCD

solid-state imaging device 103 by correlated dual sampling. The A/D converter 105 converts analog image signals from the CCD solid-state imaging device 103 through the CDS circuit 104, to digital image data. That is, the A/D converter 105 converts the output signal from the
5 CCD solid-state imaging device 103 to digital signals through the CDS circuit 104 with an optimum sampling frequency.

[0029]

The digital signal processing circuit 106 separates the digital image data inputted from the A/D converter 105 into color-difference
10 data and luminance data, and performs various processing on the separated data including preprocesses for correction and image compression and decompression. The image data compression and decompression circuit 107 performs the process of an orthogonal transformation and a Huffman encoding/decoding for image data
15 compression/decompression, for example, in conformity with the Joint Photographic Experts Group (JPEG) standard. Sound is converted into electrical signals by the microphone 111. In the AMP/FILTER 112, the sound signals in a predetermined frequency band are passed through and are selectively amplified. The A/D converter 113 then samples
20 the sound signals which have passed through the AMP/FILTER 112 into digital values with a sampling frequency which is more than double the frequency of the predetermined frequency band. Then, the sound data compression and decompression circuit 114 compresses and encodes the digital values.

25 [0030]

The FIFO 108 is a temporary memory device such as a Dynamic Random Access Memory (DRAM) and a flash memory or the like and temporarily stores compressed image and sound data therein. The compressed image and sound data stored in the FIFO 108 are read out by the card interface
30 109 and are recorded in the PC card 110, a recording medium, which is connected to the card interface 109. The CPU 121 controls operations of each unit of the digital camera according to instructions from the operation unit 123. The display device (LCD) 122 displays,

by means of the display screen 10, the mode selected and indicates operational conditions of the digital camera. The display device 122 displays in real time digital image data of an object, before photographing and during photographing, which is output from the digital image processing circuit 106 via the CPU 21 and functions as a display unit of an electronic finder. The display device 122 also displays a static image of digital image data of a photograph taken during a predetermined time so that an operator can check the image.

[0031]

The display device 122 further displays recorded image data in the PC card 110 when replaying the image. The image data in the PC card 110 are read out through the card interface 109 and the FIFO 108, and are decompressed in the image data compression and decompression circuit 107, and then are transferred from the digital signal processing circuit 106 to the CPU 121. Sound data are transferred from the FIFO 108 to the sound data compression and decompression circuit 114 in which the sound data are decompressed, and are converted into analog signals in the D/A converter 115 and then are output through the amplifier and filter 118. The operation unit 123 includes operation devices, such as the shutter release button 2 for inputting a photographing instruction, the mode dial 7, the operation buttons 8 and the indication lamps 9 for indicating operational conditions.

[0032]

When instructed by the operation unit 123, the transmission unit 124, being controlled by the CPU 121, transmits image data output from the digital signal processing circuit 106 and sound data output from the amplifier and filter 116 to an external computer, and the like. The lens driver 125 drives the lens system 101 and the shutter mechanism 102 that include the photographic optical system 3 according to a control signal provided by the CPU 121. The signal generator 126 generates drive control signals such as clock signals and provides the CCD solid-state imaging device 103, the CDS circuit 104 and the first A/D converter 105 with the generated signals to perform

respective functions. The strobe flash unit 127, being controlled by the CPU 121, flashes to illuminate an object when the shutter mechanism 102 is released.

[0033]

5 A power unit of the digital camera includes the battery 128 and the DC-DC converter 129. As the battery 128, a nickel cadmium (Ni-Cd) battery, a nickel hydrogen battery or a lithium battery is used. Voltage is converted to an appropriate level by the DC-DC converter 129 and supplied to the whole system of the digital camera. The power
10 switch 130 controls electric power supply through the DC-DC converter 129 giving control signals to the CPU 21. The power switch 130 is coupled with a sliding movement of the display cover 4 and the lens/strobe flash cover 5, and is turned off when the display cover 4 and the lens/strobe flash cover 5 are closed as illustrated in Figs.
15 1 and 2, and is turned on when the above mentioned two covers are opened as illustrated in Figs. 3 and 4.

[0034]

In photographing with the digital camera, from a state that the display cover 4 and lens strobe cover 5 of the camera body 1 are closed,
20 the display cover is opened by a sliding operation, for example, and the display cover 4 is slid to open to be usable, and then the shutter release mechanism 102 of the photographic optical system 3 is opened to photograph an object image through the CCD solid-state imaging device 103 with an operation of the shutter release button 2 in the
25 operation unit 123 while monitoring the object image obtained through the electronic viewfinder and displayed on the display screen 10 of the display device 122. The image data are recorded in the PC card 110 through the digital signal processing circuit 106.

[0035]

30 Specifically, when the camera is carried or is not being used, the display cover 4 and the lens/strobe flash cover 5 of the camera body 1 is closed, and the display screen 10 of the display device 122, the objective lens incidence plane of the photographic optical system

3 and the strobe flashing unit 11 are covered by the display cover 4 and the lens/strobe flash cover 5, as shown in Figs. 1 and 2. Thus, when the display cover 4 and the lens/strobe flash cover 5 are closed, the body of the digital camera is shaped into almost a rectangular
5 parallelepiped with a curved surface at every corners having almost no projections on the outer surface of the camera body. Further, in this state, since the objective lens incidence plane of the photographic optical system 3, the display screen 10 and the strobe flashing unit 11 are not exposed and the power supply is turned off
10 by the power switch 130 which operates corresponding to the movement of the display cover 4 and the lens/strobe flash cover 5, even if the shutter release button 2 in the operation unit 123 is pressed accidentally. Accordingly, the photographic processing system of the camera is not activated, and thus, the user can carry the camera with
15 ease.

[0036]

When the user starts to shoot or replay, from the state as shown in Figs. 1 and 2, the digital camera can be in a standby condition, i.e., ready for use when the display cover 4 is slid to open that opens
20 the lens/strobe flash cover 5 at the same time as illustrated in Fig. 6. (The nonskid grip projection 6' in Fig. 6 has a linear projection slightly different from the aforementioned one.) Then, the objective lens incidence plane of the photographic optical system 3, the display screen 10 and the strobe flashing unit 11 are exposed and the power
25 switch 130 which operates corresponding to the opening movement of the display cover 4 is turned on, the CPU 121 is activated to control a photographic processing system, and thus the digital camera is brought to a standby condition in which photographing or replay may be enabled.

30 [0037]

During a standby condition, a user can select either a picture taking or a replay mode by the mode dial 7. When the picture taking mode is selected, and when the shutter release button 2 is pressed,

the CPU 121 activates an auto focus function and opens the shutter mechanism 102 and then records image data of an object formed in the incidence plane of the CCD solid-state imaging device 103 in the PC card through the digital signal processing circuit 106.

5 [0038]

In the replay mode, image data of an object recorded in the PC card 110 are read out and a reproduced image is displayed on the display screen 10 of the display device 122. As aforementioned, the camera body 1 of the digital camera including the display cover 4 and the
10 lens/strobe flash cover 5, is configured to be almost a rectangular parallelepiped with a curved surface at every corners maintaining a fine appearance without becoming large in size and without losing a handling comfort. Further, when the camera is not in use, because the objective lens incidence plane of the photographic optical system
15 3, the display screen 10 and the strobe flashing unit 11 are covered so as not to be exposed and further the power switch 130 is turned off, the camera can be carried safely and easily.

[0039]

Further, in the mechanism of the covers described above, the
20 lens/strobe flash cover 5 is configured to move by a sliding movement of the display cover 4. However, alternatively and in reverse, the display cover 4 may be configured to move by a sliding movement of the lens/strobe flash cover 5. Furthermore, the present invention is not limited to the embodiments aforementioned and illustrated in
25 the drawings, and may include various variations within the scope of claims of the present invention.

[0040]

[Effects of the Invention]

As aforementioned, according to the present invention, the
30 digital camera includes a camera body including:

- a photographic optical system for forming an image of an object;
- an imaging device for converting an optical object image formed through the photographic optical system into electronic image data;

a recording medium for recording the image data;

an operational means for enabling a user to set photographing instructions;

5 a photographing process means for performing a predetermined processing to the image data converted by the imaging device in accordance with the instruction of the operational means and for writing the image data in the recording medium;

10 a replay and display means for reproducing and displaying the image data photographed by the imaging device and the image data recorded in the recording medium onto the display screen; and

a strobe flash means for illuminating an object when photographing,

and the digital camera includes:

15 an objective lens incidence plane of the photographic optical system and a strobe flashing unit of the strobe flash device exposed on a front of the camera body, at least a part of the operation device at an appropriate place on a outer surface of the camera body and a display screen of the replay and display means exposed on a back of the camera body;

20 a first cover means including a first cover member provided on the back of the camera body slidably within a predetermined sliding range, the first cover member being configured to cover the display screen of the replay and display means when the first cover member is located at a first position in the sliding range, and to expose the display screen of the replay and display device when located at
25 a second position within the predetermined sliding range;

a second cover means that is mechanically coupled with the first cover means and that is configured to cover the objective lens incidence plane of the photographic optical system and the strobe
30 flashing unit of the strobe flash means located on the front of the camera body with a second cover member when the first cover member is operated to locate at the first position, and, to evacuate the second cover member and expose the objective lens incidence plane of the

photographic optical system and the strobe flashing unit of the strobe flash means when the first cover member is operated to locate at the second position; and

5 a power switching means that is coupled to at least either of the first and second cover means and caused to be turned on to supply power to a whole system of the camera for activating the camera when the first and second cover members are slid to open and expose the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe
10 flashing unit of the strobe flash means and also to be turned off to stop supplying the power when the first and second cover members are slid to close and cover the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash device.
15 Accordingly, a digital camera with an improved portability and operability, and ease in handling, is provided, by making most of the latitude in designing functional structure and layout. When the camera is being carried, by preventing a replay and display screen, an objective lens incidence plane of photographic optical system and
20 a strobe flashing unit from exposing and from being accidentally operated, the portability may be improved, and without degrading the operability, the camera becomes ready to shoot with even a single operation of exposing the replay and display screen located on a back of the camera.

25 [0041]

Further, according to a digital camera in claim 2 of the present invention, a camera body includes:

a photographic optical system for forming an image of an object;
an imaging device for converting an optical object image formed
30 through the photographic optical system into electronic image data;
a recording medium for recording the image data;
an operational means for enabling a user to set photographing instructions;

a photographing process means for performing a predetermined processing to the image data converted by the imaging device in accordance with the instruction of the operational means and for writing the image data in the recording medium;

5 a replay and display means for reproducing and displaying the image data photographed by the imaging device and the image data recorded in the recording medium onto the display screen; and

a strobe flash means for illuminating an object when photographing,

10 and the digital camera includes:

an objective lens incidence plane of the photographic optical system and a strobe flashing unit of the strobe flash device exposed on a front of the camera body, at least a part of the operation device at an appropriate place on a outer surface of the camera body and a display screen of the replay and display means exposed on a back of the camera body;

a first cover means including a first cover member provided on the back of the camera body slidably within a predetermined sliding range, the first cover member being configured to cover the display screen of the replay and display means when the first cover member is located at a first position in the sliding range, and to expose the display screen of the replay and display device when located at a second position within the predetermined sliding range;

a second cover means including a second cover member which is provided slidably on the front of the camera body for covering and uncovering the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means, the second cover means causing, by mechanically coupling with the first cover means, the second cover member to cover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means provided on the front of the camera body and the first cover member to position at the first position when the second cover member is located at the first position, and

also causing the second cover member to evacuate to expose the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means arranged at the front of the camera body and the first cover member to position at the second position when the second cover member is located at the second position; and

a power switching means that is coupled with at least either of the first and second cover means and caused to be turned on to supply power to a whole system of the camera for activating the camera when the first and second cover members are slid to open and expose the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means and also to be turned off to stop supplying the power when the first and second cover members are slid to close and cover the display screen of the replay and display device, the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash device. Accordingly, in particular, when not in use, i.e., being carried, the digital camera capable of preventing a replay and display screen, an objective lens incidence plane of photographic optical system and a strobe flashing unit from exposing and from being accidentally operated, may be provided. Thus, the portability may be improved and the operability is not degraded as seen from the fact that the camera becomes ready to shoot with even a single operation of exposing the lens incidence plane of the photographic optical system located on a front of the camera.

[0042]

According to the digital camera in claim 3 of the present invention, the camera body is provided with the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means at an upper edge of one-side half of the front of camera body, and the second cover member includes a member to cover and uncover the objective lens incidence plane of

the photographic optical system and the strobe flashing unit of the strobe flash means by being slid in a horizontal direction at the upper edge of the front of the camera body. With such a configuration, a structure of cover and uncover mechanism of an objective lens incidence plane of photographic optical system and a strobe flashing unit located on a front of the camera may be provided in a substantially small space.

[0043]

According to the digital camera in claim 4 of the present invention, the camera body is provided with the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means at an upper edge of one-side half of the front of camera body, and the second cover member includes a member to cover and uncover the objective lens incidence plane of the photographic optical system and the strobe flashing unit of the strobe flash means by being slid in a vertical direction at the upper edge of the front of the camera body. With such a configuration, in particular, it becomes easier to design for manufacturing a structure of cover and uncover mechanism of an objective lens incidence plane of photographic optical system and a strobe flashing unit located on a front of the camera, with a small space occupied.

[Brief Description of the Drawings]

[Fig. 1]

Fig. 1 is a perspective view schematically illustrating an external appearance of a front side of a digital camera not in use, while being carried, according to an embodiment of the present invention.

[Fig. 2]

Fig. 2 is a perspective view schematically illustrating an external appearance of a backside of the digital camera in Fig. 1 not in use, while being carried.

[Fig. 3]

Fig. 3 is a perspective view schematically illustrating an external appearance of the front of the digital camera in use.

[Fig. 4]

Fig. 4 is a perspective view schematically illustrating an external appearance of the backside of the digital camera in use.

[Fig. 5]

5 Fig. 5 is a block diagram schematically showing an electrical structure of the digital camera in Fig. 1.

[Fig. 6]

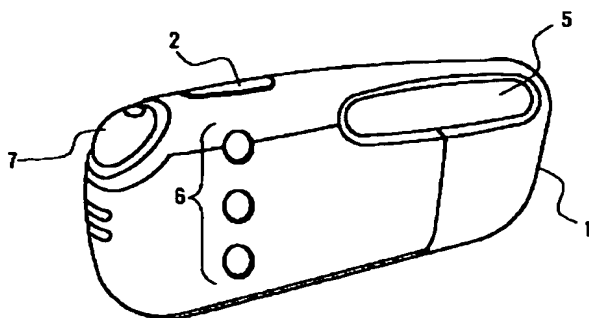
10 Fig. 6 is a perspective view illustrating the state in cover and uncover operations viewed from the front and back sides of the digital camera respectively according to another embodiment different from the digital camera in Fig. 1.

[Reference numerals]

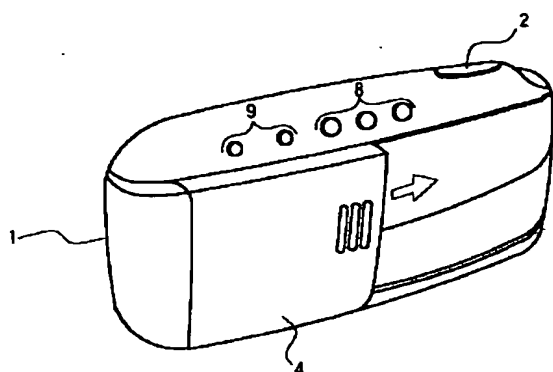
- 1 Camera body
- 2 Shutter release button
- 15 3 Photographic optical system
- 4 Display cover (First covering material)
- 5 Lens strobe flash cover (Second covering material)
- 6, 6' Nonskid grip pits/projection
- 7 Mode dial
- 20 8 Operation button
- 9 Indication button
- 10 Display screen
- 11 Strobe flashing unit
- 101 Photographic lens system
- 25 102 Shutter mechanism
- 103 CCD (charge coupled device) solid-state photographing device
- 104 CDS (correlated dual sampling) circuit
- 105 First A/D (analog-to-digital) converter
- 106 Digital signal processing circuit
- 30 107 Image data impression and decompression circuit
- 108 FIFO (first in-first out) circuit
- 109 Card interface (I/F)
- 110 PC card

	111	Microphone
	112	Filter and amplifier
	113	Second A/D (analog-to-digital) converter
	114	Sound data compression and decompression circuit
5	115	D/A (digital-to-analog) converter
	116	Filter and amplifier
	121	CPU (central processing unit)
	122	Display device (LCD)
	123	Operation unit
10	124	Transmission unit
	125	Lens driver
	126	Control signal generator (SG)
	128	Battery
	129	DC-DC converter
15	130	Power switch

[Fig. 1]

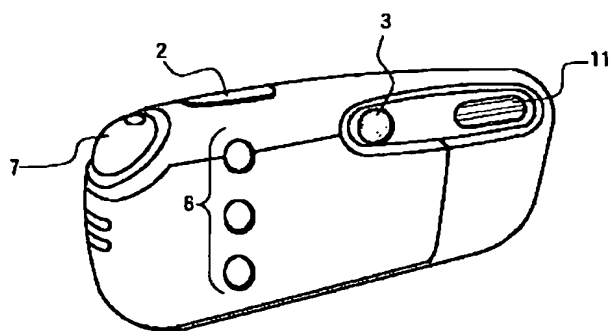


[Fig. 2]

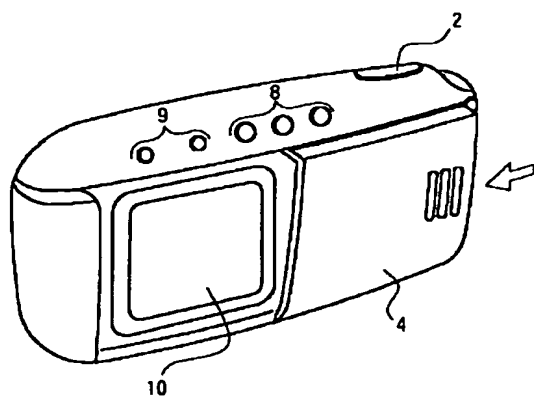


5

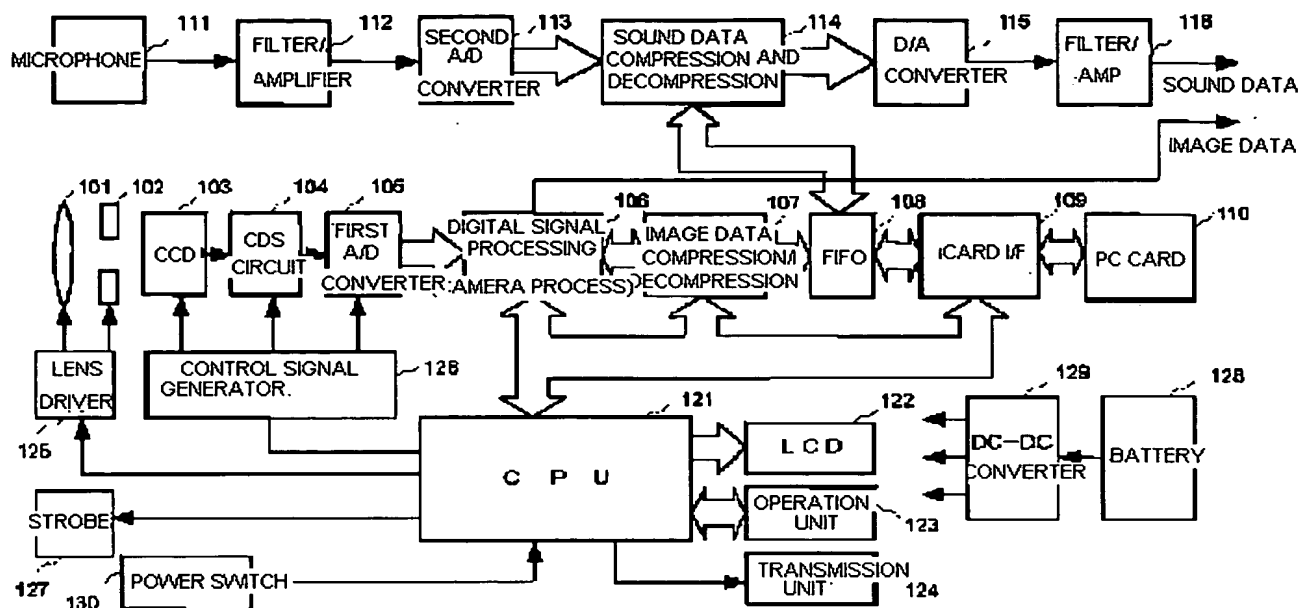
[Fig. 3]



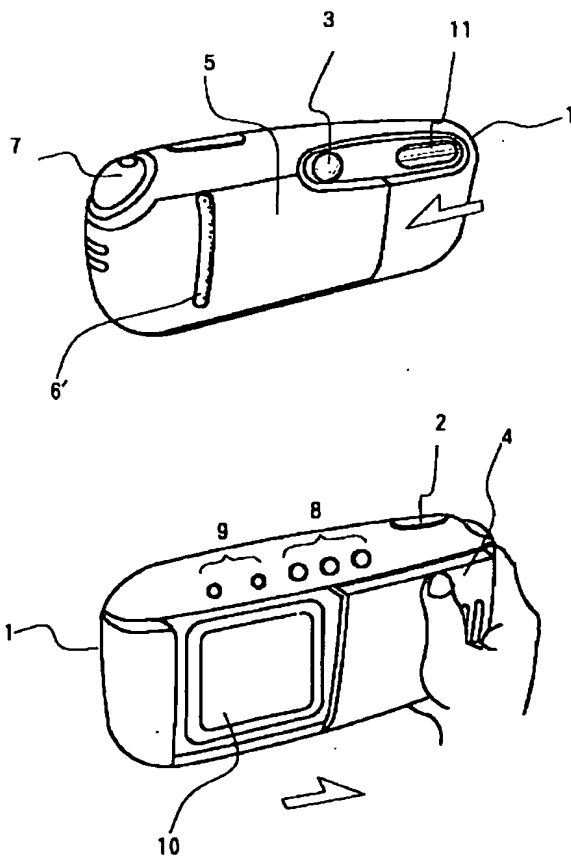
[Fig. 4]



[Fig. 5]



[Fig. 6]



[Name of Document] Abstract of Disclosure

[Abstract]

[Objectives]

5 Provision of a digital camera with an excellent portability and operability and an improved ease in handling, by making most of much latitude in designing a functional structure and layout of parts.

[Means for Achieving the Objectives]

10 A digital camera includes a display cover provided slidably on a back of a camera body 1. The display cover covers a display screen of a replay and display device at a first position, and exposes the display screen at a second position. A lens/strobe flash cover 5 is provided at a front of the camera body 1 so as to be mechanically coupled with the display cover. When the display cover is operated to position at the first position, an objective lens incidence plane of a
15 photographic optical system 3 and a strobe flashing unit of the camera body 1 are covered by the lens/strobe cover 5. Also, when the display cover is operated to take the second position, the lens/strobe flash cover 5 is evacuated to expose the objective lens incidence plane of the photographic optical system 3 and the strobe flashing unit. Power
20 supply is turned on or off corresponding to the movement of the display cover and the lens/strobe flash cover 5.

[Selected Drawing] Fig. 1